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## THE NATURAL GAS INDUSTRY

Beginning around 1920, and especially since the end of World War II, the natural gas industry has been one of the nation's important, fast growing industries. The marketed production of natural gas more than doubled in the 1920's, experienced a somewhat retarded but still substantial growth in the following decade, and again expanded to more than twice its former level in the last ten years. Since 1945, production has risen by 89 per cent. The growth of the industry has been remarkable not only in terms of absolute output but also in relation to the other energy producing industries—anthracite and bituminous coal mining, crude petroleum production, and the generation of water power. In 1920, natural gas supplied only 4 per cent of the total energy requirements of the United States. Ten years later, its share had increased to 9 per cent; by 1940, it furnished 11 per cent of the total; and, from 13 per cent in 1945, the energy supplied by natural gas rose to 19 per cent in 1950. Much of the increasing production of natural gas has involved a displacement of bituminous and anthracite coal production, although an important part of natural gas output has found its own unique markets either in special uses or in areas formerly lacking inexpensive fuel for industrial development.

The producing end of the natural gas industry has always had a close relationship to the production of crude oil. Currently, approximately a third of the gas withdrawn from underground fields is taken from oil wells, and in the past the portion associated with oil production was even higher. Moreover, the discovery of gas reserves has usually occurred in conjunction with exploratory and developmental drilling of oil wells. Like the production of oil, but with roughly a twenty-year lag, the bulk of the marketed production of natural gas also migrated from the Appalachian region to the Mid-Continent, Gulf Coast, and California fields. By the late twenties, a major part of the output was produced in several states in the Southwest, and their importance has subsequently continued to increase.

Since natural gas requires little processing before use and because it poses difficult problems in handling and storage, the most important chapters in the history of its utilization are related to the development of transmission lines. While the use of natural gas was well established in the proximity of the gas fields late in the nineteenth century, there were no pipeline facilities for the transmission of gas for more than a few hundred miles from its source prior to the late 1920's. By that time, pipeline technology permitted, and economic potentialities encouraged, the first rash of long-distance pipeline construction which carried natural gas from the Southwest to consumers in Chicago, Minneapolis, and Detroit. The adversities of the depression blunted the hopes of the expansion in the early 1930's, and it was not until after World War II that pipeline construction was again pushed ahead to transmit natural gas from the Southwest to the large markets on the Atlantic Seaboard and the Pacific Coast.

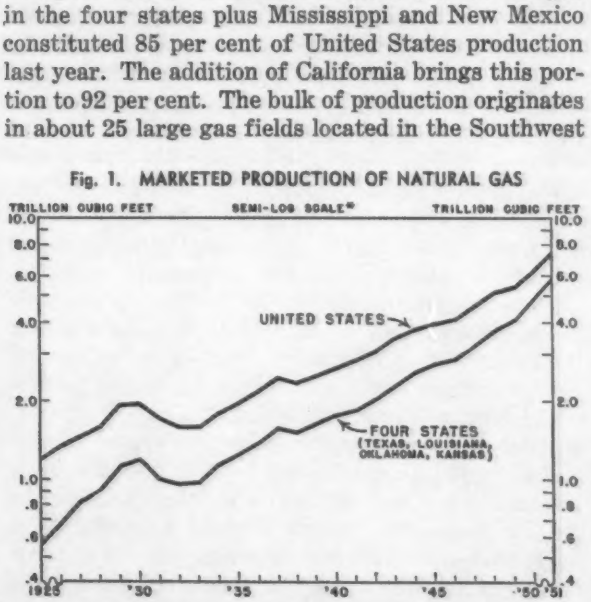
Consequently, during the past thirty years natural gas has taken on increasing significance, especially in the Southwest, which is the chief source of natural gas production and the place of departure for the major pipeline systems. During this period also, industrial development has been accelerated in the region by the availability of natural gas as a basic fuel and as a source of chemicals. Many localities in the Tenth Federal Reserve District have shared in the growth of the industry either as producing or consuming areas. The District contains the Kansas and Oklahoma portions of the Hugoton natural gas field,

as well as the San Juan Basin fields in northwestern New Mexico and southwestern Colorado. In this article, an effort is made to chart the growth of the industry and to indicate some of its cardinal characteristics. The aspects of the industry dealt with are the production of natural gas, the development of long-distance pipeline systems, the consumption of gas, its changing competitive position in the over-all supply of energy, and the regulation exercised over different phases of the industry by various governmental authorities.

**Development and Production**

The growth in the marketed production of natural gas since 1925 in the United States and in four leading producing states in the Southwest—Texas, Louisiana, Oklahoma, and Kansas—is depicted in Figure 1. Gross production exceeds the marketed output by a substantial amount, 35 per cent in 1950; some of the unmarketed gas withdrawn from underground reservoirs is returned in repressuring operations after it has functioned in the production of oil or after the natural gas liquids have been removed; some is vented or wasted. Repressuring operations were greatly expanded during World War II. In recent years, the wastage of natural gas associated with the production of oil has been considerably reduced. Most of the increase in the production of gas since 1925 has occurred in the Southwest. Gas produced in the four states mentioned above increased from less than half of the total output in that year to more than three fourths in 1951. Output in the four states plus Mississippi and New Mexico constituted 85 per cent of United States production last year. The addition of California brings this portion to 92 per cent. The bulk of production originates in about 25 large gas fields located in the Southwest and California. The development of the Texas Panhandle field and the Monroe field of northern Louisiana first tipped the balance of production toward the Southwest. Drilling in the Hugoton field of southwestern Kansas, Oklahoma, and Texas reached significant proportions in the 1930's. At the same time, discoveries were mounting in the Gulf Coast territory of Texas, Louisiana, and Mississippi, which now produces roughly two fifths of the nation's gas, mostly from a dozen large fields. Other large producing fields at the present time include the Carthage and East Texas fields in East Texas; the Wasson, Keystone, and Slaughter fields in West Texas; the San Juan Basin in northwestern New Mexico and southwestern Colorado; and the Rio Vista, Kettleman North Dome, Paloma, and Ventura fields in California.

Fig. 1. MARKETED PRODUCTION OF NATURAL GAS




*On a semi-logarithmic graph, equal slopes indicate equal rates of change.
SOURCE: U. S. Bureau of Mines.

The producers of natural gas run the gamut from small independent operators to the major oil companies and the natural gas pipeline companies. The major oil companies are probably more important than any other group since they control oil and gas rights on large acreages and their extensive exploration programs have resulted in the discovery of sizable gas reserves. Prior to World War II, the gas pipeline companies in many cases sought to develop their own sources of natural gas supply. In recent years, the tendency has been for the pipeline companies to purchase gas from independent suppliers, in part because producing properties owned by the pipeline companies have been considered as a part of their rate bases by the Federal Power Commission, thus limiting the recoverable rate of return on these properties.

The production of natural gas is regulated in the several states on the basis of statutes enacted for the conservation of petroleum and natural gas. Although the first comprehensive conservation statute dates back to 1915 in Oklahoma, the producing states did not achieve effective control until the 1930's. The waste of dry gas, such as occurred in the Panhandle field in 1934 when it was estimated that a billion cubic feet a day was vented to the air after stripping the liquid natural gasoline from the gas, has been progressively eliminated. In addition, the correlative rights of owners in the underground resource have received increasing protection, reducing the danger that one or a few producers might withdraw more than their proportionate shares from the common underground pool. Since natural gas has virtually no market in the absence of pipeline transmission facilities, it is essential that the states limit production to the nominations of pipeline companies in the fields. The mechanism developed for effecting this control of production is called "prorationing",

wherein the state conservation authority sets a production quota for a gas field estimated to meet the demand and allocates an appropriate share of the production to the individual wells. Another type of conservation measure designed to reduce excessive drilling consists of the establishment of minimum well spacing rules. For example, in the Kansas Hugoton field it is permissible to drill only one well to each 640 acres of land. Nevertheless, it is commonly held by engineers that these measures still fall short of achieving the efficiency possible in the recovery of gas (and oil) if the underground pool is treated as a unit for recovery purposes, regardless of the pattern of surface ownership. Progress in furthering the unitization of gas and oil fields has been gradual, since a few reluctant producers in a field may prevent its achievement. Among the producing states, only Oklahoma and Arkansas have enacted compulsory unitization laws, providing for unit operation if the owners of a specified majority of the surface acreage over a common pool desire it. The validity of the Oklahoma legislation was upheld by the United States Supreme Court in May of this year. Still another regulatory step taken in a number of the producing states in recent years has involved the establishment of minimum wellhead prices for natural gas by the conservation authorities.

Gas produced in association with the production of crude oil—casinghead gas—has raised particularly vexing problems with respect to conservation and marketing. Underground gas provides one of the driving forces for the production of oil. Indiscriminate release of gas pressure may result in a substantial reduction in the ultimate recovery of oil. Moreover, much of the gas produced by oil wells formerly had no available market and was flared or wasted. To foster a greater ultimate recovery of petroleum, a number of producing states have established rules governing the permissible gas-oil ratio of oil wells—the volume of gas that can be produced per barrel of oil. Casinghead gas has also been increasingly reinjected into the underground reservoir for pressure maintenance to augment the ultimate production of oil. The volume of gas withdrawn that was returned to formations in repressuring operations increased from 102 billion cubic feet in 1938 to over one trillion cubic feet in 1945, and it has continued to expand since that time. This practice also has the merit of conserving a large volume of gas which might otherwise have been wasted. The more difficult problem of flaring casinghead gas not used in repressuring and for which no pipeline facilities exist was faced directly by the Texas Railroad Commission in 1948 and 1949 when it ordered wells in a number of fields shut in to prevent waste. Subsequent reductions have followed in the quantity of gas flared in that state.

An important adjunct to the production of natural gas is the operation of some 528 field processing plants for the removal of natural-gas liquids, chiefly natural gasoline and liquefied petroleum gas. Natural gasoline is used mostly for blending purposes at petroleum refineries; liquefied petroleum gas or LPG is used as fuel in farm homes, in tractors and busses, in the chemical industry, and for a variety of other purposes. Almost all of the natural gas produced is processed for the removal of the valuable liquid hydrocarbons. The yield of liquids from casinghead gas is somewhat higher than from dry gas. Of the 477 natural gasoline plants now in operation, 183 are located in Texas, 69 in California, 67 in Oklahoma, 33 in Louisiana, 14 in Kansas, 12 in New Mexico, and 9 in Wyoming. The cycling process has been increasingly applied since 1938 for the removal of natural-gas liquids from gas produced in condensate fields; this process returns the dry gas to the reservoir after the liquids have been obtained. Most of the 51 cycling plants in existence are found in the deep gas condensate fields of the Texas and Louisiana Gulf Coast region. Since those states prohibit the venting of gas from gas wells, the cycling process permits the recovery of the liquids and provides for the restoration of gas, which has no market outlet, to the underground reservoir for future use.

**Pipeline Systems**

In the past, the discovery and production of natural gas have tended to outrun its available markets. The utilization of gas has required the construction of pipeline facilities, and with the gradual improvement of pipeline technology it has become feasible to market gas at greater and greater distances from the producing fields. Although it is possible to trace the antecedents of several of the major gas pipeline systems back into the nineteenth century, it was not until the late 1920's that consolidation and construction began to give the industry the form it now exhibits. A sketch of the evolution of some of the major components of the pipeline network provides an indication of the growth and scope of the industry.

Natural gas production in the Appalachian region found a market from the start in the center of the bituminous coal area. A pipeline supplying gas to Cincinnati from West Virginia was built in 1909. This facility and others in Ohio, Pennsylvania, West Virginia, and Kentucky were merged to form the present Columbia Gas System, Incorporated, in 1926. Service was extended to Washington, D. C., in 1931 when another transmission line was completed. Since 1943, Columbia has been purchasing increasing quan-

tities of gas from the Southwest and now obtains a major portion of its supplies from the transcontinental pipelines. The Consolidated Natural Gas Company, another large system in the Appalachian region, serves a territory which included the vicinity of Pittsburgh in 1885, parts of West Virginia in 1894, and Cleveland in 1903. In 1931, a pipeline was laid from northern Pennsylvania to supply natural gas to Auburn, Syracuse, and other cities in upstate New York. In the Mid-Continent region, pipelines which later become component parts of the Cities Service Company were constructed from eastern Kansas gas fields to Joplin in 1904 and to Wichita and Kansas City in 1907. The source of gas in eastern Kansas was depleted rapidly and a supply line was built to Oklahoma a few years later. Beginning in 1927, the company extended its lines to tap the Panhandle field in Texas. The predecessor companies of the largest present-day natural gas pipeline system, United Gas Corporation, also date back to the early years of the century. Natural gas was piped to Shreveport in 1906 from a nearby gas field. The system did not take on its comprehensive shape, however, until the active building program of the late 1920's was completed and the properties were combined in 1930. A pipeline was constructed from East Texas to Beaumont in 1926 and extended a year later to Dallas and Fort Worth. At the same time, lines were reaching from gas fields in East Texas and near Corpus Christi to Houston, as well as southward from the Panhandle field. Another pioneer natural gas company in the Southwest, Lone Star Gas Company, first supplied gas to Dallas and Fort Worth in 1910; its system now constitutes a comprehensive network concentrated in North Texas and southern Oklahoma. All five of these systems—Columbia, Consolidated, Cities Service, United, and Lone Star—are integrated; their functions include natural gas production, transmission, and wholesale and retail distribution.

In California, natural gas was introduced in Los Angeles in 1913 by the Pacific Lighting Corporation, which with its subsidiaries now serves practically all of southern California. San Francisco first received natural gas in 1929 by pipeline from the Kettleman Hills field constructed as a part of the Pacific Gas and Electric Company system. Natural gas supplies in California have proved inadequate for the two systems, and since World War II pipelines have been constructed to obtain gas from Texas.

The extension of long-distance transmission lines from the Southwest began in 1927 with the Colorado Interstate Gas Company line which brought natural gas from the Panhandle field to Pueblo, Colorado Springs, and Denver. The following year, the Mississippi River Fuel Corporation built a pipeline from the Monroe field in northern Louisiana to St. Louis. Also emanating from the Monroe field, a pipeline was laid by the Southern Natural Gas Company to Birmingham and Atlanta in 1929. More recently the company has extended its sources of supply to include the Carthage and Logansport fields in East Texas and Louisiana and the Gwinville field in Mississippi. Chicago received its first natural gas in 1931 upon the completion of the Natural Gas Pipeline Company line from the Hugoton and Panhandle fields. Similarly, Omaha, Des Moines, Sioux City, and Minneapolis were the recipients of natural gas transmitted from the Panhandle and Hugoton fields by the Northern Natural Gas Company system, organized in 1930. This first phase of long-distance pipeline construction was virtually completed in 1932 when Panhandle Eastern Pipe Line Company placed in operation its line from the Panhandle and Hugoton fields to Detroit.

The failure of natural gas supplies to keep pace with needs in the Appalachian region during World War II led to the construction of the Tennessee Gas and Transmission Company line from the Texas Gulf Coast and Carthage fields to West Virginia, which was completed in 1944. The principal purchasers from this line are the Columbia and Consolidated systems in that area. In 1950, the line was extended to Buffalo. The Big and Little Inch lines built during the war for the transport of petroleum products were acquired by Texas Eastern Transmission Corporation in 1947 for the movement of natural gas from East Texas and Texas Gulf Coast fields to the Appalachian region, Philadelphia, and New York City. Another transcontinental pipeline, the Texas Gas Transmission Corporation, began deliveries from the Carthage and Monroe fields to Louisville, Kentucky, late in 1949 and was supplying the Texas Eastern lines at Middletown, Ohio, early in 1950. A year later, Transcontinental Gas Pipe Line Corporation completed a line from the Rio Grande Valley in Texas to furnish natural gas to utilities in New York City, New Jersey, and Philadelphia. However, not all of the postwar pipeline construction has been directed toward the supply of gas to the Appalachian and Eastern Seaboard regions. The El Paso Natural Gas Company pipeline from Permian Basin and Panhandle fields, connecting with a Pacific Lighting system pipeline, to supply Los Angeles with natural gas began operations in 1947. El Paso started making deliveries to supply San Francisco with natural gas from Texas in 1950. Additional supplies of gas from San Juan Basin fields were made available to the Pacific Gas and Electric system for distribution in the San Francisco Bay area with the completion of El Paso's line tapping that field in 1951. In

the Midwest, the construction program of Michigan-Wisconsin Pipe Line Company was completed in 1949, bringing natural gas from the Hugoton field in Texas and Oklahoma to Milwaukee and Madison and supplementing supplies being furnished by Panhandle Eastern in the Detroit area. Late last year, another line was placed in operation to furnish gas to the Chicago area. That area already had in existence a supply line from the Hugoton and Panhandle fields. The new company, Texas Illinois Natural Gas Pipeline Company, is affiliated with the existing supplier and draws its natural gas from the Texas Gulf Coast area. Panhandle Eastern also provided itself with access to Texas Gulf Coast gas recently by the construction of a subsidiary pipeline from that area connecting with its existing line in Illinois.

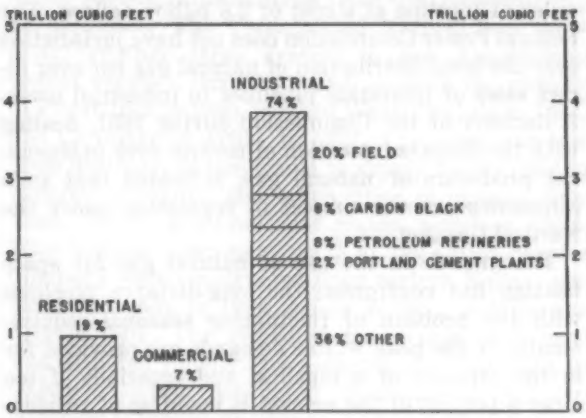
The transmission capacities of the older systems have been enlarged many times through looping (parallel construction), extension, and expansion of compressor station capacity. At the present time, both Texas Eastern and United have major expansion programs under way. The Texas Eastern construction involves a pipeline that will take gas from United in Mississippi and deliver it to Consolidated system companies in western Pennsylvania. United's expansion in the Southwest includes a line from the Agua Dulce field on the Texas Gulf Coast to the Monroe field and another line originating from production in the Gulf of Mexico off the Louisiana shore inland to Jackson, Mississippi. Major interest is currently being directed to the laying of pipelines to serve the last remaining major markets in the country still without natural gas—New England and the Pacific Northwest. Certificates have been issued by the Federal Power Commission to enable Texas Eastern to reach various parts of New England through Algonquin Gas Transmission Company and to provide a New England outlet for the Tennessee system through Northeastern Gas Transmission Company. Approval is pending on plans to transmit natural gas from northern Alberta to the Pacific Northwest.

In the Natural Gas Act of 1938, the Federal Power Commission was given jurisdiction over companies engaged in the transportation and sale of natural gas in interstate commerce for resale by local utilities to ultimate consumers. In this capacity the Commission has authority to regulate rates, to order extension or prevent abandonment of facilities, and to prescribe a uniform system of accounts. An amendment to the Act in 1942 gave the Commission certificate authority over the construction and operation of new and additional pipeline facilities. Up to the end of the fiscal year 1951, a total of 727 certificates had been issued authorizing the construction of 42,384 miles of pipeline at a cost of 2.8 billion dollars. The Federal Power Commission does not have jurisdiction over the local distribution of natural gas nor over direct sales of interstate pipelines to industrial users. A decision of the Commission during 1951, dealing with the disputed question of control over independent producers of natural gas, indicated that such companies are not subject to regulation under the Natural Gas Act.

The growth in the use of natural gas for space heating has confronted the long-distance pipelines with the problem of fluctuating seasonal requirements. If the peak winter demands are provided for in the capacity of a pipeline, and especially if too large a portion of the market is made up of residential space heating load, the line may have large unused capacity during much of the year and operate with a low annual "load factor"—the ratio of average daily demand to maximum daily demand. In order to improve their load factors, a number of pipeline companies have contracted for the supply of gas to large industrial users on an interruptible basis, so that a portion of the load may be dropped if necessary during the space heating season and the pipeline facilities fully used throughout the year. This practice has met with considerable criticism from industrial users, despite the fact that interruptible contracts have carried low rates. In addition to the obvious alternative of larger lines and accompanying higher costs to provide all service on a firm, noninterruptible basis, the pipeline companies and gas utilities have been utilizing underground storage fields near the consuming centers to supplement the supply of gas from transmission lines during periods of peak load. Many of the underground storage projects have been made in old, depleted gas and oil reservoirs, although this is not true in all cases. Underground storage capacity has been increased rapidly in recent years; in 1951 it was enlarged one third. There are now some 142 underground storage projects in existence. Another alternative open to utilities in meeting fluctuations in demand is the use of stand-by manufactured gas plant facilities. This is especially feasible where utilities have recently converted from manufactured to mixed or natural gas.

**Consumption** Natural gas is chiefly an industrial fuel. The distribution of the use of natural gas in 1949, shown in Figure 2, reveals that approximately three fourths of the total was used for industrial purposes; residential consumption accounted for one fifth of the total; and commercial use represented about 7 per cent. On the other hand, the industry derived half of its revenue from sales

Fig. 2. CONSUMPTION OF NATURAL GAS, 1949




SOURCE: U. S. Bureau of Mines.

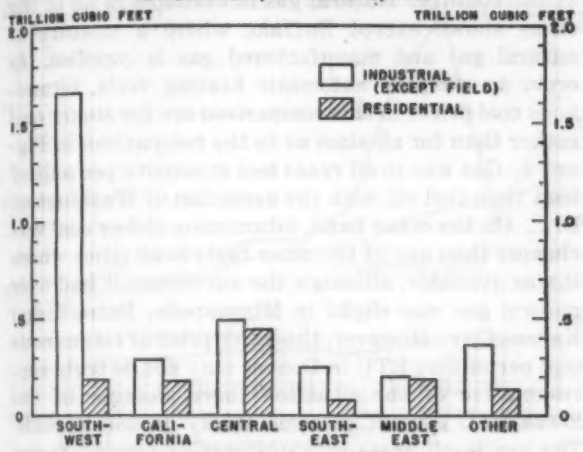
of gas to domestic users, 38 per cent from sales to industrial consumers, and 12 per cent from sales to commercial customers. Residential and commercial consumption, primarily for space heating, water heating, and cooking, has grown rapidly during the last decade. From 1939 to 1949, commercial use almost tripled, while residential consumption increased 154 per cent and industrial consumption almost doubled. By 1950, there were 17 million residential users of natural or mixed gas, almost twice the number having such service in 1939.

A larger quantity of gas is used in the gas and oil fields for drilling, pumping, and operating gasoline recovery plants than for any other major purpose. However, field use during the last decade has grown less than any other demand, with the exception of carbon black manufacture. In 1939, field use accounted for 28 per cent of the gas consumed; by 1949, it had declined to one fifth. The consumption of natural gas by carbon black plants reached a peak in 1947 and has remained fairly stable during the last three years at slightly less than the 1945 consumption of 432 billion cubic feet. While the use of natural gas in the manufacture of carbon black has decreased since the early postwar years, the use of oil for that purpose has been mounting sharply. The substitution of liquid hydrocarbons for natural gas in this process has resulted from the rising field prices of natural gas—carbon black manufacturers paid an average of 5.2 cents per thousand cubic feet of gas in 1951 as compared with 0.9 cents in 1939. Carbon black plants using natural gas have located in the natural gas fields to take advantage of low-valued gas without alternative markets. All of the 53 plants in operation during 1950 were located in the Southwest, with the exception of one in California. (Carbon black is used primarily in the manufacture of rubber tires.) The recent shift away from the use of natural gas in making carbon black, like the slow growth in the field use of gas, reflects the ability of natural gas to find more highly valued uses with the extension of pipeline facilities.

The consumption of natural gas as a fuel at petroleum refineries has increased more rapidly during the war and postwar years than any other use. Petroleum refineries located chiefly in the Southwest and California consumed four and one half times as much natural gas in 1950 as they did in 1939. Similarly, the use of natural gas and mixed gas by electric utilities in the generation of electrical energy has risen rapidly in the past decade. Electric utility use of natural gas accounts for more than one tenth of all the gas consumed, and it is also heavily concentrated in the Southwest and California, although not so much as the use in petroleum refining. Portland cement plants are heavy users of fuel, and in areas where natural gas is cheap it is employed for that purpose. Fluctuations during the last twenty years in the volume of gas used in cement manufacture have closely paralleled the ups and downs in heavy construction activity, although natural gas has made some gains relative to the use of coal.

Other industrial utilization of natural gas, excluding that consumed by electric utilities (which is included in "other" industrial in Figure 2), absorbs about one fourth of all natural gas consumed. Most of the gas in this category is used by manufacturing industries other than carbon black, petroleum refining, and portland cement—especially the chemical; iron and steel; stone, clay, and glass; food products; paper; and nonferrous metal industries. The other industrial—manufacturing and mining—consumption of natural gas is less concentrated geographically than any of the previous industrial uses discussed. Less than two fifths of this type of consumption occurs in the four southwestern states of Texas, Louisiana, Oklahoma, and Kansas, despite the clustering of the chemical industry on the Gulf Coast. The industrial states of Pennsylvania, Illinois, and Ohio, which receive most of their gas by long-distance pipeline, consume approximately one fifth of the natural gas used for other industrial purposes. Gas is consumed chiefly by industry as fuel for boilers or for heat treatment and processing. Even in the chemical industry (exclusive of carbon black), only a minor portion of the natural gas consumed is used as a raw material; most of the gas is used as fuel. The rapidly growing petrochemical industry uses mostly the heavier component of natural gas (ethane) and the natural gas liquids. There are, however, some eight synthetic ammonia plants and several methanol plants which use dry gas as feed-

Fig. 3. INDUSTRIAL AND RESIDENTIAL CONSUMPTION OF NATURAL GAS, BY REGIONS, 1950




NOTE: Southwest: Kansas, Louisiana, Oklahoma, and Texas.
Central: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin.
Southeast: Alabama, Georgia, Kentucky, Mississippi, and Tennessee.
Middle East: New York, Pennsylvania, and West Virginia.
Other: Arizona, Arkansas, Colorado, Delaware, District of Columbia, Florida, Maryland, Montana, Nebraska, New Jersey, New Mexico, North Dakota, South Dakota, Utah, Virginia, and Wyoming.

SOURCE: U. S. Bureau of Mines.

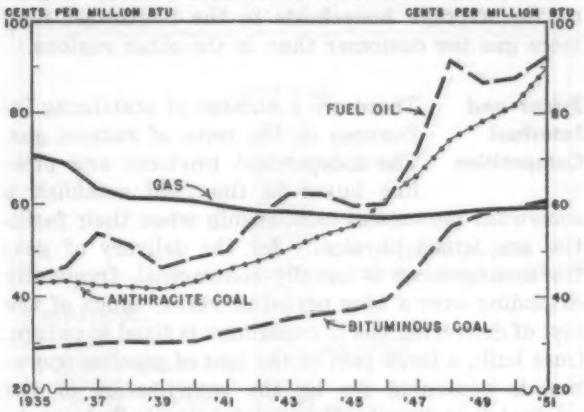
stock. Nevertheless, the large scale conversion of natural gas into liquid fuels that was anticipated in the early postwar years has not yet materialized, largely because of the ability of the oil industry to keep step with needs.

Differences in the over-all pattern of natural gas consumption are revealed in Figure 3, where total industrial consumption (excluding field but including carbon black, petroleum refineries, and portland cement) and residential consumption are shown for various regions using approximately 89 per cent of the gas consumed for both of those purposes in 1950. Industrial consumption exceeded residential use in all of the regions. The volume of natural gas used for industrial purposes in the Southwest far exceeded that used in any other region and constituted more than half of the industrial consumption in the entire country. One quarter of the industrial use in the Southwest (except oil and gas field use) was in the manufacture of carbon black, 22 per cent in petroleum refining, 18 per cent in the generation of electric power, and 35 per cent in other industrial—manufacturing and mining—applications. In the Middle East, practically all of the industrial consumption was for manufacturing and mining (other industrial) purposes, while in the Central States 80 per cent was used by manufacturing and mining enterprises and almost a fifth in electric power production. The residential use of natural gas, on the other hand, was less concentrated geographically. Household consumption in the Central States and the Middle East exceeded that in the Southwest, although on the average households in the Southwest used more gas per customer than in the other regions.

**Prices and Interfuel Competition** There are a number of stabilizing influences on the price of natural gas. The independent producer and pipeline buyer in the field establish a somewhat permanent relationship when their facilities are joined physically for the delivery of gas; the arrangement is usually contractual, frequently extending over a long period of years. Much of the cost of delivering gas to consumers is fixed in nature. Once built, a large part of the cost of pipeline operation is accounted for by the amortization of the original investment. Transport costs bulk large in the value of gas after long-distance transmission. Moreover, the rates charged by interstate pipelines are subject to regulation by the Federal Power Commission, which allows a 6 to 6½ per cent recovery on the "prudent investment" value of property. At the consuming end, natural gas prices are controlled by the state public utility commissions. The prices of the chief competing fuels, on the other hand, contain a far smaller proportion of fixed costs and are relatively free to move with the pressure of market forces. Coal prices are composed of a high proportion of wage cost, and miners' wages have advanced substantially in the last decade. Residual fuel oil is generally sold as a refinery by-product, and its price has fluctuated widely in the past few years, even at times when the prices of crude oil and other refined products have been stable. Consequently, during an inflationary period, it is not peculiar that natural gas has made competitive gains in addition to filling needs in areas where it already had locational advantages.

The entire fuel economy, however, is not a competitive one. Natural gas at present is not a practical alternative to the use of gasoline in automobiles, nor can it displace diesel fuel in railroad locomotives or coking coal in blast furnaces. A comparison of the cost of alternative fuels should focus on those uses where technical exchangeability is possible and should include cost factors other than the prices of the fuels which inevitably enter any practical situation. Despite the limitations which must accompany any general price comparisons of fuel over time, several comparisons are made below which may be useful in revealing the changes that have occurred in the prices per unit of heat contained for the various fuels. Comparisons are made of the cost of gas, fuel oil, anthracite coal, and bituminous coal used for house heating in large cities and of the cost of fuels for industrial purposes in Oklahoma and in Illinois.

Fig. 4. PRICES OF HOUSE HEATING FUELS IN LARGE CITIES




NOTE: Fuel oil: No. 2 fuel oil; average for 22 cities.
Gas: gas for space heating; data at end of period represent average for 19 cities, based upon natural gas in 16 cities, manufactured gas in 2 cities, and mixed gas in 1 city.
Anthracite coal: Pennsylvania anthracite, chestnut size; average for large cities combined.
Bituminous coal: all sizes; average for large cities combined.
SOURCE: Computed from price data supplied by the U. S. Bureau of Labor Statistics.

The prices of the various fuels used for house heating, where available in 34 large cities in the United States, are shown from 1935 through 1951 in Figure 4. Gas for residential space heating was available early this year in nineteen of the large cities—natural gas in sixteen, manufactured gas in two, and mixed gas in one. Natural gas has become increasingly important as a component of the gas price series as it has been introduced in more and more areas. The bituminous coal price is the average for all sizes; the anthracite price shown is for the chestnut size. No. 2 fuel oil, available in 22 of the cities, is the light grade of oil most commonly used for domestic space heating. Prices for physical quantities of the fuels were reduced to a common heat unit basis by using conversion factors based on the BTU (British Thermal Unit) heat content of the various fuels. The comparison reveals that, prior to 1942, gas was the most expensive of the four fuels for residential space heating; in that year, the price of fuel oil surpassed gas. In 1946 anthracite became more expensive than gas, and in 1950 bituminous coal became more costly than gas. These comparisons make no adjustment for differences in the ability of heating devices to convert efficiently to heat the energy contained in the fuels, the ease or convenience of handling, or the installation cost of heating facilities. On the basis shown, however, the price of gas moved from a level more than twice as high as the cheapest fuel, bituminous coal, in 1939 to a level slightly less than bituminous coal and 35 per cent under the price of fuel oil in 1951.

Comparisons are made in Table 1 of the prices on March 15, 1952, of various fuels used in house heating in several specific cities located in various parts of the country. Natural gas is available in all of the cities shown except Buffalo, where a mixture of natural gas and manufactured gas is supplied. In order to compare automatic heating fuels, bituminous coal prices in this comparison are for stoker coal rather than for all sizes as in the comparison in Figure 4. Gas was in all cases less expensive per unit of heat than fuel oil, with the exception of Washington, D. C. On the other hand, bituminous stoker coal was cheaper than any of the other fuels in all cities where it was available, although the advantage it had over natural gas was slight in Minneapolis, Detroit, and Kansas City. However, the lower price of bituminous coal per million BTU in Denver may not be truly representative of the situation there, because of the lower BTU content of some Rocky Mountain coals. The use in all areas of a uniform conversion factor for bituminous coal has the effect of understating the price for the lower grade coals. It is not likely that this type of variation distorts the comparison significantly in the other areas.

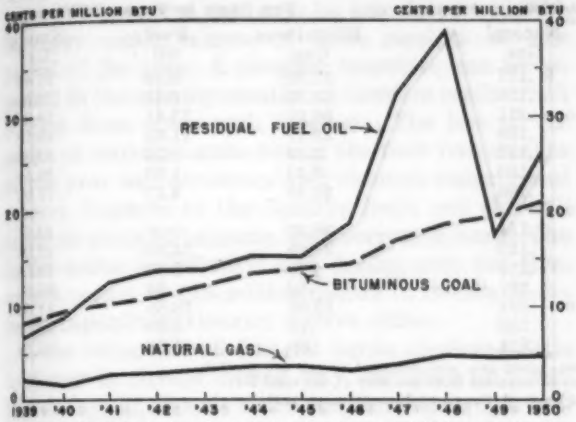
Table 1. RETAIL PRICES OF VARIOUS FUELS PER MILLION BTU, MARCH 15, 1952

| | Gas for Space Heating[1] | Bituminous Coal[2] | Anthracite[3] | No. 2 Fuel Oil |
|---|---|---|---|---|
| Buffalo | $ .819 | $ .464 | $ .960 | $1.003 |
| Denver | .447 | .390 | n.a. | .952 |
| Detroit | .701 | .670 | n.a. | 1.001 |
| Kansas City | .467 | .433 | n.a. | .860 |
| Minneapolis | .736 | .733 | n.a. | .999 |
| San Francisco | .454 | n.a. | n.a. | .825 |
| Washington | 1.076 | .526 | .920 | .918 |

[1]Natural gas, except in Buffalo where mixed gas is provided.
[2]High volatile stoker coal.
[3]Chestnut size.
n.a. Not available.
SOURCE: Computed from price data supplied by the U. S. Bureau of Labor Statistics.

With respect to industrial utilization, the chief competition occurs among bituminous coal, residual fuel oil, and natural gas. The prices of these three fuels at the source in Oklahoma are plotted in Figure 5 from 1939 through 1950. The price series shown are for natural gas at wells, bituminous coal at mines, and No. 6 fuel oil at Group 3 Oklahoma refineries, where the latter is produced and sold in tank car lots f.o.b. refinery. The price advantage of natural gas was substantial throughout the entire period. The value of natural gas per million BTU at the wellhead in 1950 was less than one fourth the price of bituminous coal at the mine and less than one fifth the price of residual fuel oil. The price differentials were reflected in the use of fuels in manufacturing in the state. According to data computed from the Census of Manufactures, Oklahoma manufacturers in 1947 obtained 89 per cent of their energy supplies from natural gas, 5 per cent from bituminous coal, only 2

Fig. 5. PRICES OF INDUSTRIAL FUELS AT SOURCE IN OKLAHOMA




NOTE: Residual fuel oil: No. 6 fuel oil at Group 3 Oklahoma refineries.
Bituminous coal: average price at mines, including selling cost.
Natural gas: average price at wells.

SOURCE: Computed from price data of U. S. Bureau of Mines and Platt's Oil Price Handbook for 1951.

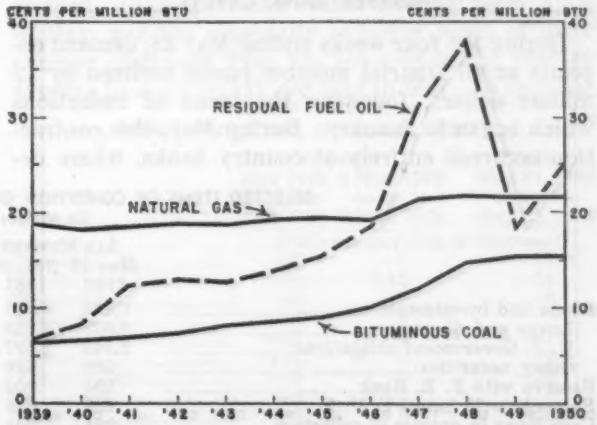
per cent from residual fuel oil, and the remainder from other sources.

Located in or near the producing fields, the Oklahoma user of natural gas pays little for pipeline transportation to the point of consumption. In order to present a sample from the price record of areas where natural gas bears the cost of long-distance transmission, a comparison has been drawn for Illinois in Figure 6. The average price of natural gas sold to industrial consumers is plotted along with the price of bituminous coal at mines and the price of No. 6 fuel oil at Chicago and East St. Louis (Oklahoma Group 3 basis plus freight). Natural gas has been available for industrial use in Chicago, East St. Louis, and Peoria during the entire period considered. As shown in Figure 6, the price of residual fuel oil rose above that of natural gas in 1947 and has remained above it since, except for a short time in 1949. Bituminous coal has been cheaper than gas and oil throughout the decade, although in the case of gas the difference has been narrowed by price movements since World War II. Bituminous coal accounted for roughly two thirds of the energy consumed in manufacturing in Illinois in 1947; fuel oil supplied 13 per cent; and natural gas furnished 7 per cent.

The extent of the utilization of natural gas for industrial fuel in various parts of the country has been determined by the distance from the sources of gas supply, the pattern of the pipeline network, and the proximity of competing fuels. In all of the states of the Southwest, natural gas supplied at least three fourths of the energy used in manufacturing in 1947; in Texas, natural gas provided 94 per cent of the energy consumed. Even in the coal mining states of West Virginia and Pennsylvania, natural gas supplied 18 per cent and 6 per cent of the manufacturing fuel, respectively. Areas such as New York City, which had little natural gas available for industrial use in 1947 and at rather high prices, depended chiefly on fuel oil and coal to fulfill their needs. In those areas served by long-distance transmission lines, the effect of the proximity of other fuels was clearly evident in shaping the pattern of fuel consumption. In Illinois and Ohio, where coal is produced in abundance, only 7 per cent of the energy used in manufacturing in 1947 was furnished by natural gas, whereas natural gas supplied 19 per cent of the needs in Iowa and 16 per cent in Minnesota. The proportion of the supply of energy furnished by the various fuels in the states and metropolitan areas of the Tenth Federal Reserve District is presented in Table 2.

The expanding pipeline network and the favorable competitive position natural gas now occupies as a result of the inflationary developments of the last decade, unless sharply reversed, probably mean that natural gas will make further inroads into new domestic and industrial markets in the years immediately ahead. Proved reserves of natural gas, although small in relation to coal resources, are favorable in comparison with those of oil. On January 1, 1952, natural gas reserves were estimated by the American Gas Association at 194 trillion cubic feet, or 24 times the net production in 1951. The relationship of the discovery rate to current production, perhaps the most important factor to be considered in appraising the reserve position, has remained positive during recent years. While natural gas prices

Fig. 6. PRICES OF INDUSTRIAL FUELS IN ILLINOIS




NOTE: Natural gas: average price at point of consumption for total industrial consumption.
Residual fuel oil: No. 6 fuel oil at refineries or water terminals in Chicago or East St. Louis areas (Group 3 Oklahoma refinery basis, plus freight).
Bituminous coal: average price at mines, including selling cost.

SOURCE: Computed from price data of U. S. Bureau of Mines and Platt's Oil Price Handbook for 1951.

Table 2. COST AND PERCENTAGE OF VARIOUS FUELS USED IN MANUFACTURING, 1947

| District States | Average Cost per Million BTU | | | Per Cent of Total BTU[1] | | |
|---|---|---|---|---|---|---|
| | Bituminous Coal | Fuel Oil | Natural Gas | Bituminous Coal | Fuel Oil | Natural Gas |
| Colorado | $ .186 | $ .419 | $ .137 | 27.88[2] | 6.42 | 17.40 |
| Kansas | .169 | .376 | .129 | 13.82 | 6.41 | 73.59 |
| Missouri | .179 | .418 | .211 | 50.97 | 12.41 | 26.82 |
| Nebraska | .216 | .495 | .189 | 32.17 | 11.65 | 45.76 |
| New Mexico | .188 | .430 | .137 | 3.34 | 5.34 | 89.46 |
| Oklahoma | .150 | .379 | .100 | 5.34 | 1.63 | 88.51 |
| Wyoming | .156 | .419 | .108 | 22.56 | 4.11 | 71.03 |
| Metropolitan Areas | | | | | | |
| Denver | .190 | .352 | .154 | 38.32 | 7.06 | 44.96 |
| Kansas City | .173 | .340 | .152 | 21.69 | 24.30 | 47.34 |
| Lincoln | .214 | .608 | .217 | 4.30 | 8.83 | 73.59 |
| Oklahoma City | .308 | .483 | .127 | .15 | .34 | 95.07 |
| Omaha | .266 | .502 | .194 | 19.50 | 18.89 | 41.09 |
| Tulsa | .252 | .333 | .103 | .10 | 5.05 | 90.77 |
| Wichita | .237 | .348 | .124 | .39 | 4.08 | 86.18 |

[1]Percentages do not add to 100 because anthracite coal, coke, manufactured gas, mixed gas, and electrical energy are omitted.
[2]In addition, coke (used primarily in the manufacture of iron and steel in Pueblo) supplied 31.45 per cent of the total BTU.
SOURCE: Leland W. McCloud, Comparative Costs of Competitive Fuels; based on U. S. Census of Manufactures, 1947..

have been slow to respond to upward pressures in the past, there is reason to anticipate some upward adjustments in the future. Various producing states have displayed their ability to establish minimum field prices. Many of the purchase contracts drawn in recent years have provided escalator clauses for the increase of field prices if the buyer purchases gas in the same vicinity from another source at a higher price in the future. Another type of impending increase in field prices is illustrated by the purchase contract of Transcontinental Gas Pipe Line Corporation in the La Gloria field in Texas. This contract provides for the field price to advance from seven cents per thousand cubic feet during its first two and one half years to twelve cents during the last three and one half years of a twenty-year period. Aside from the resource and institutional influences on the future utilization of fuels, the natural gas industry will inevitably undergo change in the future as a result of technological development. One group of current technical experiments now in progress in the utilization of energy resources, which may have important effects on natural gas, is concerned with the underground gasification of coal. Whatever the course of future developments, however, the natural gas industry during the last thirty years has gained an important position within the industrial complex —one from which it will not easily be displaced.

# BUSINESS CONDITIONS

## MEMBER BANK CREDIT

During the four weeks ending May 28, demand deposits at all District member banks declined by 12 million dollars, following the trend of reductions which began in January. During May, this contraction occurred entirely at country banks, where demand deposit volume was lowered 17 million dollars. At reserve city banks, demand deposits expanded by 5 million, in spite of a loss of interbank deposits totaling 27 million dollars. The reduction of demand deposits from December through May appears to be a regularly recurring development at banks in the Tenth District and is observable in each of the past

SELECTED ITEMS OF CONDITION OF TENTH DISTRICT MEMBER BANKS
(In millions of dollars)

| | All Member Banks | | | Reserve City Banks | | | Country Banks | | |
|---|---|---|---|---|---|---|---|---|---|
| | May 28 1952 | Apr. 30 1952 | May 30 1951 | May 28 1952 | Apr. 30 1952 | May 30 1951 | May 28 1952 | Apr. 30 1952 | May 30 1951 |
| Loans and investments | 5,104 | 5,062 | 4,643 | 2,880 | 2,850 | 2,574 | 2,224 | 2,212 | 2,069 |
| Loans and discounts | 2,037 | 2,039 | 1,960 | 1,170 | 1,175 | 1,172 | 867 | 864 | 788 |
| U. S. Government obligations | 2,545 | 2,507 | 2,213 | 1,416 | 1,387 | 1,149 | 1,129 | 1,120 | 1,064 |
| Other securities | 522 | 516 | 470 | 294 | 288 | 253 | 228 | 228 | 217 |
| Reserve with F. R. Bank | 894 | 904 | 856 | 556 | 557 | 532 | 338 | 347 | 324 |
| Balances with banks in U. S. | 623 | 646 | 566 | 257 | 264 | 243 | 366 | 382 | 323 |
| Cash items in process of collection | 294 | 304 | 276 | 274 | 281 | 257 | 20 | 23 | 19 |
| Gross demand deposits | 5,668 | 5,680 | 5,280 | 3,267 | 3,262 | 3,014 | 2,401 | 2,418 | 2,266 |
| Deposits of banks | 887 | 915 | 780 | 822 | 849 | 723 | 65 | 66 | 57 |
| Other demand deposits | 4,781 | 4,765 | 4,500 | 2,445 | 2,413 | 2,291 | 2,336 | 2,352 | 2,209 |
| Time deposits | 817 | 816 | 718 | 422 | 425 | 387 | 395 | 391 | 331 |
| Total deposits | 6,485 | 6,496 | 5,998 | 3,689 | 3,687 | 3,401 | 2,796 | 2,809 | 2,597 |
| Borrowings | 99 | 77 | 36 | 91 | 69 | 30 | 8 | 8 | 6 |

five years. The decline represents an outward movement of funds and seems to be associated with the normally small volume of farm receipts at this period of the year. A reversal, therefore, can be expected in the coming months as farmers realize cash income from crops and livestock. The loss of deposits at country banks during the first five months of the year was accommodated through reduction of reserve balances at the Reserve Bank and through drawing down of balances with correspondents. The latter action is reflected in a decline over the five-month period of 176 million dollars in interbank demand deposits at District reserve cities.

Loan volume at all District banks displayed little tendency to change during May, declining by 5 million dollars at reserve cities and increasing by 3 million dollars at country member banks. On May 28, loan volume at reserve city banks, as a result of the nearly continuous decline which has occurred since the beginning of the year, was at virtually the same level as on the corresponding date last year. Country bank loans have increased by 79 million, or 10 per cent, in the same twelve-month period.

Investments of all District member banks increased by 44 million dollars during the period from April 30 to May 28. A major part of the increase represented acquisition of Government securities, chiefly Treasury bills, and raised total investment portfolios of these banks to 3,067 million, 14 per cent above the corresponding date last year. Although non-Government securities constitute only about 17 per cent of total District member bank security holdings at present, the volume of these securities held by District banks has expanded at a significantly higher rate in the past five months than the volume of Government securities. All of the increase in non-Government securities has been at reserve city banks and may be a reflection of the decline in outstanding loans thus far this year at District reserve city banks, as well as a growing interest in tax-exempt securities.

### BANK DEBITS

| | May 1952 | 5 Mos. 1952 | Change from '51 May | Change from '51 5 Mos. |
|---|---|---|---|---|
| | (Thousand dollars) | | (Per cent) | |
| COLORADO | | | | |
| Colo. Springs | 51,878 | 275,875 | −6 | 0 |
| Denver | 733,087 | 3,678,826 | −3 | +1 |
| Gr. Junction | 19,142 | 89,601 | +13 | +2 |
| Greeley | 30,495 | 145,490 | +24 | +4 |
| Pueblo | 53,214 | 256,623 | −2 | −2 |
| KANSAS | | | | |
| Atchison | 9,788 | 52,080 | −6 | −7 |
| Dodge City* | 19,546 | — | — | — |
| Emporia | 11,273 | 60,385 | −9 | −10 |
| Hutchinson | 38,921 | 218,317 | +1 | +5 |
| Independence | 8,642 | 43,684 | +5 | +9 |
| Kansas City | 86,647 | 445,974 | −4 | +1 |
| Lawrence | 13,684 | 68,059 | +18 | +12 |
| Manhattan | 12,893 | 62,378 | +14 | +10 |
| Parsons | 10,743 | 55,970 | +28 | +29 |
| Pittsburg | 13,330 | 67,604 | +7 | +3 |
| Salina | 33,279 | 186,943 | −13 | −4 |
| Topeka | 97,366 | 513,120 | −4 | −2 |
| Wichita | 329,710 | 1,753,993 | +21 | +18 |
| MISSOURI | | | | |
| Independence | 15,275 | 70,774 | +19 | +13 |
| Joplin | 33,531 | 164,465 | +11 | +9 |
| Kansas City | 1,235,225 | 6,325,602 | −1 | 0 |
| St. Joseph | 99,758 | 542,878 | −8 | −6 |
| NEBRASKA | | | | |
| Fremont | 20,998 | 102,597 | 0 | −1 |
| Grand Island | 32,529 | 158,986 | +11 | +10 |
| Hastings | 16,528 | 78,695 | 0 | −2 |
| Lincoln | 96,891 | 473,932 | +2 | 0 |
| Omaha | 626,647 | 3,105,083 | 0 | −4 |
| NEW MEXICO | | | | |
| Albuquerque | 141,813 | 690,689 | +20 | +10 |
| Santa Fe | 34,402 | 161,774 | +4 | −2 |
| OKLAHOMA | | | | |
| Bartlesville | 182,234 | 947,020 | +8 | +12 |
| Enid | 32,992 | 183,521 | −4 | +2 |
| Guthrie | 4,823 | 26,140 | +17 | +4 |
| Lawton | 22,325 | 105,423 | +23 | +18 |
| Muskogee | 29,732 | 148,012 | +8 | +7 |
| Norman | 9,096 | 44,611 | +10 | +3 |
| Okla. City | 413,565 | 2,092,085 | +6 | +5 |
| Okmulgee | 7,516 | 37,631 | +8 | +3 |
| Ponca City | 22,320 | 109,319 | +15 | +7 |
| Tulsa | 648,852 | 3,399,018 | +6 | +14 |
| WYOMING | | | | |
| Casper | 43,964 | 227,705 | +21 | +27 |
| Cheyenne | 31,971 | 198,040 | −13 | +5 |
| District, 40 cities | 5,357,079 | 27,368,922 | +2 | +4 |
| U. S., 342 cities | 135,955,000 | 681,613,000 | +4 | +4 |

*Not included in totals; new reporting center, beginning in May, 1952.

### DEPARTMENT STORE TRADE

The dollar volume of sales at reporting department stores in this District in May was 10 per cent larger and in the first three weeks of June about 12 per cent larger than in the corresponding periods a year ago. Increased dollar volume for the second quarter has about offset the decrease recorded for the first quarter, and total sales for the first half of 1952 are little changed from those in the first half of 1951. Sales increased rather sharply from April to May, and the seasonally adjusted index of daily average sales rose from 104 per cent of the 1947-49 average in April to 112 per cent in May. In contrast

### DEPARTMENT STORE SALES AND STOCKS

| | Sales: May 1952 comp. to May 1951 | Sales: 5 Mos. 1952 comp. to 5 Mos. 1951 | Stocks: May 31, 1952 comp. to May 31, 1951 |
|---|---|---|---|
| | (Per cent increase or decrease) | | |
| Denver | +3 | −7 | −18 |
| Pueblo | +1 | −11 | −23 |
| Hutchinson | +9 | −5 | −8 |
| Topeka | +15 | 0 | 0 |
| Wichita | +12 | −2 | −7 |
| Joplin | +11 | 0 | −8 |
| Kansas City | +12 | 0 | −10 |
| St. Joseph | −1 | −9 | * |
| Omaha | +7 | 0 | −25 |
| Oklahoma City | +10 | −2 | −12 |
| Tulsa | +17 | +6 | −4 |
| Other cities | +13 | −2 | −9 |
| District | +10 | −2 | −13 |

*Not shown separately but included in District total.

with the cool, wet weather of a year ago, the weather this year has been favorable to the movement of seasonable merchandise. Soft goods, such as apparel, continue in good demand, and there has been some improvement in the demand for some types of household durables, chiefly furniture and major household appliances.

## EMPLOYMENT

Civilian employment in the United States increased slightly in May to 61,176,000; the gain was due to seasonal increases in agriculture, construction, and other outdoor work. The current level, however, is slightly under May, 1951, owing chiefly to decreases in employment in the consumer durables, leather, textiles, and apparel industries. These decreases were slightly more than the increases reported in the defense industries—ordnance, aircraft, and metals; consequently, manufacturing employment for the United States is down from the first of the year and also as compared with a year ago. Tenth District employment has been stable since the first of the year, and there is a gain over a year ago as a result of an expansion in manufacturing employment. The expansion occurred because of increases in ordnance and aircraft employment. Those industries showing a decline in employment nationally are not heavily concentrated in the District.

As employment in the United States and the Tenth District is currently stabilized at fairly high levels, it is well to examine at this time the expansion that has occurred since the start of the Korean conflict. The accompanying table presents nonagricultural and manufacturing employment in March, 1952, and the percentage change in total nonagricultural employees and manufacturing employees for the United States, the seven Tenth District states, and their metropolitan and nonmetropolitan areas from July, 1950, to March, 1952. Nonagricultural employment increased 6.7 per cent in the seven Tenth District states over the twenty-one month period compared with a 4.2 per cent increase in the United States. As a general rule, it is apparent that the metropolitan areas have expanded employment at a faster rate than have the smaller urban areas. The increase in the District metropolitan areas was 10.3 per cent compared with only 2.6 per cent in the nonmetropolitan areas.

The increases in employment in the District were widely scattered. In fact, all states except Nebraska and Wyoming had a greater rate of expansion in nonagricultural employment than the United States as a whole, and all states except Wyoming had a greater rate of expansion in manufacturing employment. The concentration of the employment gains in the metropolitan areas is emphasized by the fact that nonagricultural employment declined over the twenty-one month period in the nonmetropolitan areas in Nebraska, Oklahoma, and Wyoming, while the increase in nonmetropolitan areas of Kansas failed to match the national average. Manufacturing employment grew at about the same rate in metropolitan areas as in the remainder of the District. However, the rate of increase in manufacturing employment in the metropolitan areas of all of the District states exceeded that of the United States, but the rate of growth in nonmetropolitan Colorado, New Mexico, Oklahoma, and Wyoming lagged behind. Manufacturing employment in nonmetropolitan Kansas and Nebraska increased rapidly over the twenty-one month period, reflecting the reactivation of several ordnance plants. Consequently, the expansion was concentrated in several areas and was not widely distributed. As shown in the 1950 Census, metropolitan areas in the District grew faster than the smaller urban areas throughout the 1940's. From the material presented here, it appears that this phenomenon has continued.

**EMPLOYMENT IN MARCH, 1952**
**(In thousands)**

| | Total Nonagricultural Employees | | | Manufacturing Employees | | |
|---|---|---|---|---|---|---|
| | Total | Metropolitan Areas | Nonmetropolitan Areas | Total | Metropolitan Areas | Nonmetropolitan Areas |
| Colorado | 393.2 | 251.2 | 142.0 | 65.3 | 54.4 | 10.9 |
| Kansas | 512.4 | 227.6 | 284.8 | 131.3 | 90.1 | 41.2 |
| Missouri | 1,235.5 | 872.9 | 362.6 | 383.3 | 298.0 | 85.3 |
| Nebraska | 324.2 | 164.7 | 159.5 | 58.9 | 40.3 | 18.6 |
| New Mexico | 162.2 | 47.0 | 115.2 | 14.2 | 7.6 | 6.6 |
| Oklahoma | 503.5 | 233.6 | 269.9 | 77.4 | 39.7 | 37.7 |
| Wyoming | 81.2 | 0 | 81.2 | 6.2 | 0 | 6.2 |
| Seven states | 3,212.2 | 1,797.0 | 1,415.2 | 736.6 | 530.1 | 206.5 |
| U. S. | 45,964.0 | — | — | 15,836.0 | — | — |

**PERCENTAGE CHANGE IN EMPLOYMENT, JULY, 1950, TO MARCH, 1952**

| | Total Nonagricultural Employees | | | Manufacturing Employees | | |
|---|---|---|---|---|---|---|
| | Total | Metropolitan Areas | Nonmetropolitan Areas | Total | Metropolitan Areas | Nonmetropolitan Areas |
| Colorado | +10.0 | +13.1 | +4.9 | +11.8 | +12.9 | +6.9 |
| Kansas | +10.6 | +22.8 | +2.5 | +42.3 | +47.9 | +31.2 |
| Missouri | +6.3 | +6.5 | +5.9 | +9.5 | +7.8 | +15.9 |
| Nebraska | +2.3 | +5.1 | −0.4 | +16.4 | +14.8 | +20.0 |
| New Mexico | +9.6 | +5.6 | +11.3 | +19.3 | +49.0 | −2.9 |
| Oklahoma | +6.1 | +16.2 | −1.3 | +15.2 | +31.0 | +2.2 |
| Wyoming | −6.8 | — | −6.8 | −1.6 | — | −1.6 |
| Seven states | +6.7 | +10.3 | +2.6 | +15.7 | +16.2 | +14.3 |
| U. S. | +4.2 | — | — | +7.2 | — | — |

NOTE: The metropolitan areas or portions thereof within state boundaries are: Colorado — Denver and Pueblo; Kansas — Kansas City, Topeka, and Wichita; Missouri — Kansas City, St. Joseph, and St. Louis; Nebraska — Lincoln and Omaha; New Mexico — Albuquerque; Oklahoma — Oklahoma City and Tulsa.

SOURCE: Employment and Payrolls, U. S. Department of Labor and state employment agencies.